
The Myth of Zheng He's Great Treasure Ships

Christopher Wake

Zheng He – the “Grand Eunuch of the Three Jewels” – has long been celebrated in Chinese popular culture and among overseas Chinese in Southeast Asia for his heroic exploits as commander of the Ming naval expeditions to the Indian Ocean in the early fifteenth century.¹ The purpose of these expeditions, and of earlier ones in the Song and Yuan periods, was to impress foreigners with China's power and wealth and to exalt the emperor's position in the eyes of his own subjects by fostering a regular procession of tribute-bearing missions from foreign lands. Where the Ming expeditions differed from those of earlier times was principally in the scope of their operations – which included state trading alongside the traditional exchange of presents between tributary and suzerain – and in their sheer scale. Zheng He commanded a series of voyages which extended over three decades and involved the deployment of great fleets and tens of thousands of soldiers and officials on journeys that lasted for years and which eventually took the Chinese as far as the Red Sea and the coast of Africa.

Some indication of the scale of these voyages is conveyed by figures in Chinese sources. The *Shu yu zhou zi lu* [*Record of Despatches Concerning the Different Countries*], a work that dates from 1520, records an order from the beginning of the Yongle emperor's reign (1402-1424) for the construction of 250 vessels for the use of envoys going to the Western Ocean.² According to the official history of the Ming dynasty, the *Ming shi*, a work not completed until 1736, Zheng He went with sixty-two “large ships” (*da bo*) and 27,800 “government troops” on the first voyage in 1405-1407.³ Another source gives

¹See Ma Huan, *Ying-Yai Sheng-Lan. The Overall Survey of the Ocean's Shores* (Cambridge, 1970), 7; and Louise Levathes, *When China Ruled the Seas: The Treasure Fleet of the Dragon Throne, 1405-33* (New York, 1994), 188-193.

²J.J.L. Duyvendak, “The True Dates of the Chinese Maritime Expeditions in the Early Fifteenth Century,” *T'oung Pao*, XXXIV (1939), 356 and 364, note 2.

³*Ming shi*, chapter 304, 2b; and W.P. Groeneveldt, “Notes on the Malay Archipelago and Malacca Compiled from Chinese Sources,” *Verhandelingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen*, XXXIX (1877), 42. On *bo*,

27,870 as the total of military and civilian personnel and sixty-three as the number of ships.⁴ Fei Xin, who was on the third (1409-1411) voyage, states that Zheng He took forty-eight “sea-going ships” (*hai bo*, *hai chuan*) and “more than 27,000 government troops.”⁵ A later writer gives 27,550 for the total personnel on the seventh (1431-1433) voyage.⁶

There is nothing inherently improbable about these figures. The envoys who conducted a party of Yuan court ladies to Persia in 1292 sailed in a fleet of fourteen large ships. According to Marco Polo, who travelled with them, the vessels had four masts “and many times went with twelve sails.” At least four or five had crews of 250 to 260.⁷ “Between ladies and men,” they carried “six hundred persons,” excluding sailors. Polo indicates that the vessels were similar to the large Quanzhou merchantmen that regularly sailed to India, each of which was accompanied by several smaller vessels. Polo also states that the Quanzhou Indiamen were manned by 150-300 men, depending on size, and the smaller attendant vessels by forty to 100 men.⁸ According to Ibn Battuta, a less reliable observer who encountered them half a century later, the largest had crews of 600 and carried 400 marines for protection.⁹

meaning “ocean-going ships,” a “foreign” or South China word originally applied to Indian Ocean craft trading to China, see Paul Pelliot, “Quelques textes chinois concernant l’Indochine Hindouisée,” *Études Asiatiques publiées à l’occasion du vingt-cinquième anniversaire de l’École Française d’Extrême-Orient*, II (1925), 255-258.

⁴Gu Qiyuan, *Ke zuo zui yu* [*My Boring Discourses to My Guests*], as cited in Duyvendak, “True Dates,” 357, note 5. According to another source, sixty-three was the number of vessels on the fourth voyage. See Pao Tsen-Peng, *On the Ships of Cheng-Ho* (Taipei, 1961), 20-21.

⁵Paul Pelliot, “Les grands voyages maritimes chinois au début du XVe siècle,” *T’oung Pao*, XXX (1933), 281. Another contemporary text cited in *ibid.*, 282-283, has forty-eight “treasure ships” (*bao chuan*). See also Fei Hsin, *Hsing-ch’a sheng-lan The Overall Survey of the Star Raft* (Wiesbaden, 1996), 33. A sixteenth-century source states that there were “30,000 government troops” (Duyvendak, “True Dates,” 373, note 1). See also Pao, *Ships of Cheng-Ho*, 20 and 26.

⁶Zhu Yunming, *Xia Xiyang* [*Down to the Western Ocean*], in Zhu, *Qian wen ji* [*Record of Things Once Heard*], as cited in Ma, *Ying-Yai Sheng-Lan*, 15.

⁷A.C. Moule and Paul Pelliot (eds.), *Marco Polo: The Description of the World* (2 vols., London, 1938), I, 90-91.

⁸*Ibid.*, 90 and 354-356.

⁹H.A.R. Gibb and C.F. Beckingham (eds.), *The Travels of Ibn Battuta, A.D. 1325-1354* (4 vols., Cambridge, 1958-1994), IV, 813.

The figures in the *Ming shi* and the other works cited above for the number of ships and men in Zheng He's fleet are quite believable, even if they may not be entirely accurate. But the *Ming shi* and other sources also contained statements about the size of the vessels – and about their legendary commander – which are much less credible.¹⁰ The *Ming shi* states that the sixty-two “large ships” of the first voyage measured forty-four *zhang* (440 Chinese feet) in length and eighteen *zhang* in width, and thus were about 137 metres from bow to stern and about fifty-six metres in the beam. Other sources give slightly different information. The *Guo que* of Tan Qian, a work of the Ming period, states that there were sixty-three “treasure ships” (*bao chuan*) and gives the dimensions of the two largest classes as forty-four by eighteen and thirty-seven by fifteen *zhang*. Four other works – the “Genealogy of Zheng He;” Luo Maodeng's *San Bao Taijian xia Xiyang* ([*The Three-Jewel Eunuch Goes Down to the Western Ocean*], an historical romance published in 1597); Gu Qiyuan's *Ke zuo zui yu*, which dates from some time before 1628; and a single copy of the *Ying-yai Sheng-Lan* of Ma Huan – all give 44.4 (instead of forty-four) by eighteen and thirty-seven by fifteen *zhang* as the dimensions of the largest classes. The “Genealogy,” Gu Qiyuan and Tan Qian all agree in putting the total number of vessels at sixty-three. Luo Maodeng states that there were thirty-six vessels of the largest class.¹¹

Clearly all these statements derived from a common source. This cannot have been the earliest of these works, the *Ying-Yai Sheng-Lan*, however, which in its original completed form dates from shortly after the return of the seventh voyage in 1433, since all versions, including the one that mentions the size of the ships, lack the further details found in the other three texts. The conclusion must be that the reference in this copy was a later interpolation, since it does not appear in other versions of the same work or in either contemporary account by Fei Xin and Gong Zhen, both of whom evidently had access to the *Ying-Yai Sheng-Lan* in its original form.¹² The common source of

¹⁰The same work that records the Yongle emperor's order to build 250 vessels for voyages to the Western Ocean also states that Zheng He was nine-feet (2.8 metres) tall and had a girth of ninety inches (nine feet). Another source makes him seven-feet tall and about five feet around the waist. See Ma, *Ying-Yai Sheng-Lan*, 7; and Levathes, *When China Ruled the Seas*, 64 and 214, note 64.

¹¹Pao, *Ships of Cheng-Ho*, 5-6; *Ming shi*, ch. 304, 2b; Gu, *Ke zuo zui yu*, as cited in Duyvendak, “True Dates,” 357; and Luo Maodeng, *San bao tai jian Xiyang ji tong su yan yi* (Shanghai, 1985), 187-188.

¹²Fei, *Hsing-ch'a sheng-lan*; and Gong Zhen, *Xiyang fan guo zhi* [*Record of Foreign Countries in the Western Ocean*], originally published with forewords dated 1436 and 1434, respectively. Ma, *Ying-Yai Sheng-Lan*, 36, 55 and 63; and Fei, *Hsing-ch'a sheng-lan*, 17.

all these accounts might be Luo Maodeng's work of fiction, since this gives details not found elsewhere, or it may be some other earlier composition, now lost, upon which they all drew to some degree.

The dimensions attributed to Zheng He's ships are much greater than those of any other ocean-going sailing vessels with wooden hulls of which there are authentic accounts. China's largest wooden vessels appear to have been the man-powered, paddle-wheel boats built in the thirteenth century for anti-piracy work on the Yangzi lakes; their reported dimensions were up to 360 (Chinese) feet in length and forty-one feet in the beam.¹³ Nothing else remotely approaching the size of these strange craft is reported from China, with the sole exception of the even larger dimensions attributed to the vessels of Zheng He's fleet. In the West the largest wooden-hulled sailing vessels were all naval vessels before the nineteenth century, and none exceeded 250 feet (seventy-six metres) in length. Wooden-hulled sailing vessels attained their greatest size in the West in the middle of the nineteenth century, almost at the very moment when wood gave way to iron and steel. The largest ever built is said to have been the Boston clipper *Great Republic*, launched in 1853, which measured 335 by fifty-three by thirty-eight feet (102 by sixteen by 11.5 metres), with a registered tonnage of 4555 tons.¹⁴ *Roanoke*, which followed in 1892, measured 311 by forty-nine feet and had a registered tonnage of 3400 tons and a reputed deadweight cargo capacity of 5400 tons.¹⁵ In their day these vessels were considered to be at the very limit of what was possible, or practical, in the construction of wooden sailing ships.

It is not surprising, therefore, that the great size attributed to Zheng He's vessels – almost 100 feet longer and nearly three and one-half times as wide as *Great Republic* – should be treated with scepticism by scholars with an understanding of the practicalities of wooden sailing ships. W.P. Groeneveldt in 1877 dismissed the dimensions in the *Ming shi* as "improbable," while at the same time acknowledging the Ming practice of employing very large ves-

¹³Jung-pang Lo, "China's Paddle-Wheel Boats," *Tsing Hua Journal of Chinese Studies*, New Series, II, No. 1 (1960), 197.

¹⁴Frederick William Wallace, *Wooden Ships and Iron Men* (London, 1924; reprint, London, 1973), 16; and Richard Woodman, *The History of the Ship. The Comprehensive Story of Seafaring from the Earliest Times to the Present Day* (London, 1997), 204.

¹⁵Frederick C. Matthews, *American Merchant Ships 1850-1900* (2 vols., Salem, MA, 1930-1931), I, 265; and John Lyman, "The Largest Wooden Ships," *Mariner's Mirror*, XXXI (1945), 43.

sels on embassy voyages.¹⁶ Ivon Donnelly (1925) and Paul Pelliot (1933) concurred.¹⁷ Others, notably Henri Cordier (1920) and Jacques Gernet (1972 and 1996), referred circumspectly to the "great size" of Zheng He's vessels.¹⁸

Attempts have been made to estimate the size of Zheng He's vessels from sources other than the *Ming shi* and related texts. In a paper published in 1947 Guan Jincheng argued that they could not have been more than twenty *zhang* (sixty-two metres) in length if, as one source appears to indicate, they had four masts.¹⁹ Jung-pang Lo subsequently concluded from an examination of the *liao* ratings of various types of Ming vessel that they would have had a burthen of about 500 (short) tons.²⁰ More recently, Hsu Yun-ts'iao has suggested, also on the basis of *liao* ratings, that they may have been approximately 166 feet long and 24.3 feet wide (fifty by 7.4 metres).²¹

The arguments of these scholars and the scepticism of others notwithstanding, the current orthodoxy is that Zheng He's great "treasure ships" were indeed the colossal structures that the *Ming shi* made them out to be. *The Cambridge History of China* states that Zheng He's fleet consisted of vessels "ranging in size from nine-masted junks, 444 feet long and 186 feet wide, to smaller five-masted junks, 180 feet long and 68 feet wide." *The Cambridge Illustrated History of China* gives the length of the largest as 440 feet. Edward

¹⁶Groeneveldt, "Notes on the Malay Archipelago," 42. See also Friedrich Hirth and W.W. Rockhill (eds.), *Chau Ju-kua: His Work on the Chinese and Arab Trade in the Twelfth and Thirteenth Centuries* (St. Petersburg, 1911), 34-35, note 2.

¹⁷Ivon A. Donnelly, "Early Chinese Ships and Trade," *Mariner's Mirror*, XI, No. 4 (1925), 349; and Pelliot, "Les grands voyages," 274.

¹⁸Henri Cordier, *Histoire générale de la Chine et de ses relations avec les pays étrangers* (4 vols., Paris, 1920), III, 31; Jacques Gernet, *Le Monde Chinois* (Paris, 1972), 350; and Gernet, *A History of Chinese Civilization* (2nd ed., Cambridge, 1996), 402. See also Bai Shouyi (ed.), *An Outline History of China* (Beijing, 1982), 334.

¹⁹Guan Jincheng, "Zheng He xia Xiyang de chuan" ["The Ships with which Zheng He Went to the Western Ocean"], *Dong Fang Za Zhi*, XLIII, No. 1 (15 January 1947), 49, as cited in Pao, *Ships of Cheng-Ho*, 3 and 40.

²⁰Jung-pang Lo, "The Emergence of China as a Sea Power during the Late Sung and Early Yüan Periods," *Far Eastern Quarterly*, XIV, No. 4 (1955), 493, note 18; Lo, "China's Paddle-Wheel Boats," 209, note 52; and Lo, "Decline of the Early Ming Navy," *Oriens Extremis*, V (1958), 151.

²¹Hsu Yun-ts'iao, "Notes Relating to Admiral Cheng Ho's Expeditions," *Journal of the Malaysian Branch, Royal Asiatic Society*, XLIX, No. 1 (1976), 139-140.

L. Dreyer's *Early Ming China* states that they were flat-bottomed, 440 [Chinese] feet long and 180 feet wide, had nine masts and displaced 3100 tons.²²

The ultimate authorities for these and similar accounts are papers published by J.R. Mills, Pao Tsen-Peng and Zhou Shide in the early 1960s.²³ In 1960 Mills suggested that "a rough idea" of the size of Zheng He's ships may be derived from a consideration of the Portuguese carrack *Madre De Dios*, which was captured by the English in 1592.²⁴ This was said to have been 165 feet in length, with a maximum breadth of about forty-seven feet and a draft of thirty-one feet. Mills contended that the largest Chinese junks must have been "appreciably longer and broader" since they carried (according to Ibn Battuta) 1000 persons – 200 more than the grossly overcrowded carracks. Mills concluded that the largest of Zheng He's great ships "must have had a burthen of about 2500 tons," and that the "probabilities indicate" that they had an overall length of about 300 feet – the practical limit for wooden sailing vessels – and a displacement of about 3100 tons.²⁵

²²Hok-Lam Chan, "The Chien-wen, Yung-lo, Hung-hsi, and Hsüan-te Reigns," in Frederick W. Mote and Denis Twitchett (eds.), *The Cambridge History of China. Volume 7. The Ming Dynasty, 1368-1644, Part I* (Cambridge, 1988), 232; Patricia Buckley Ebrey, *The Cambridge Illustrated History of China* (Cambridge, 1996), 209; and Edward L. Dreyer, *Early Ming China. A Political History, 1355-1435* (Stanford, 1982), 195 and 200-201.

²³See, notably, John K. Fairbank and Edwin O. Reischauer, *China. Tradition and Transformation* (North Sydney, 1979), 198; John K. Fairbank, "Introduction: Maritime and Continental in China's History," chapter 1 in Fairbank (ed.), *The Cambridge History of China. XII: Republican China 1912-1949, Part 1* (Cambridge, 1983), 16; Frederic Wakeman, Jr., "Voyages," *American Historical Review*, XCVIII, No. 1 (1993), 10-11; and Haraprasad Ray, "China and the 'Western Ocean' in the Fifteenth Century," in Satish Chandra (ed.), *The Indian Ocean. Explorations in History, Commerce and Politics* (New Delhi, 1987), 117. See also L. Carrington Goodrich, *A Short History of the Chinese People* (New York, [1943]; reprint, London, 1972), 188 and 190; Edwin O. Reischauer, *East Asia. The Great Tradition* (Boston, 1960), 321; Dun J. Li, *The Ageless Chinese. A History* (New York, 1965), 286; and Woodman, *History of the Ship*, 51.

²⁴J.R. Mills, "The Largest Chinese Junk and Its Displacement," *Mariner's Mirror*, XLVI, No. 2 (1960), 147-148.

²⁵Charles E. Gibson, *The Story of the Ship from the Earliest Days to the Present* (London, 1958), 145. Mills, "The Largest Chinese Junk," 147, also suggests alternative figures of 2000-tons displacement and 1500-tons burthen. These are based on a misreading of J.J.L. Duyvendak, *China's Discovery of Africa: Lectures Given at the University of London on January 22 and 23, 1947* (London, 1949), 18. Mills mistook Indian Ocean "ox-head-ships" for Chinese "horse ships," the latter taken to be 500 tons

J.R. Mills' figures for burthen and displacement were subsequently accepted by J.V.G. Mills; noted without demurrer by Joseph Needham; and are frequently cited on the authority of these two.²⁶ On the question of length, however, J.V.G. Mills and Needham differ. J.V.G. Mills followed J.R. Mills in maintaining that the largest vessels were probably about 300 feet long and 150 feet wide.²⁷ Needham, on the other hand, accepted the *Ming shi*'s figure of 440 feet (136.8 metres) for overall length. But by way of qualification, he suggested that "in the typical Chinese build the upper decks and poop can override the bottom timbers by some thirty percent, so that for the dimensions given a bottom length of about 310 ft. could be assumed."²⁸

Needham's acceptance of the *Ming shi* dimensions owed something to the work of Zhou Shide on the rudderpost discovered in 1962 at the site of the Dragon River Shipyards outside Nanjing, where Zheng He's ships were built. This measured just over eleven metres in length, with a rudder attachment length of six metres. From the inferred rudder blade area of 42.5 square metres, Zhou deduced that the vessel for which it was made would have an overall length of 480 or 536 Chinese feet (149 or 166 metres), greater even than that given in the *Ming shi* for Zheng He's "great ships."²⁹ For Needham this was confirmation of the reliability of the *Ming shi*. "The discovery of the rud-

(Lo, "Emergence of China as a Sea Power," 493, note 18), and so obtained 1500 tons for "treasure ships."

²⁶Ma, *Ying-Yai Sheng-Lan* 31; and Joseph Needham, *Science and Civilisation in China. Volume 4: Physics and Physical Technology. Part III: Civil Engineering and Nautics* (Cambridge, 1971), 452, note b. See also 481 and 509, where Needham suggested "1,500 tons if not considerably more," presumably on J.R. Mills' authority.

²⁷Mills' annotations in Ma, *Ying-Yai Sheng-Lan*, 31.

²⁸Needham, *Science and Civilisation*, IV, part 3, 480. See also Wakeman, "Voyages," 10. Needham is not alone in attempting to save the credibility of the *Ming shi*. Scholars in the People's Republic of China have suggested that forty-four *zhang* in the *Ming shi* meant 440 feet (*chi*) of about 26.75 to twenty-eight cm., instead of the standard Ming foot of 31.10 cm., thus making the vessels about 386 to 404 English feet (117 to 123 metres) in length. See Levathes, *When China Ruled the Seas*, 80, and the illustration following 128 of a model of a nine-masted "treasure ship" on display at the Zheng He Research Institute in Nanjing, which represents "a consensus of scholarly opinion in China." See also Gang Deng, *Chinese Maritime Activities and Socioeconomic Development, c. 2100 B.C.-1900 A.D.* (Westport, CT, 1997), 50-53.

²⁹Zhou Shide, "Cong bao chuan chang duo gan de jian ding tui lun Zheng He bao chuan" ["Estimate of (the Size of) the Great Treasure Ships of Cheng Ho based on the Discovery of a Rudderpost at the Site of a Ming Shipyard"], *Wen Wu Can Kao Zi Liao*, No. 3 (1963), 38-39. See also Zhou Shide, "Shipbuilding," in *Ancient China's Technology and Science* (Beijing, 1983), 480.

derpost shows that the Ming texts are not ‘spinning a yarn’ when they give dimensions at first sight hard to believe for the flagships of Cheng Ho’s fleet.”³⁰ Yet Zhou’s conclusion is so extreme that a question must surely arise as to the soundness of his methodology. In fact, Zhou used ratios of hull length to depth, and of rudder area to hull length by depth that pertained to vessels of quite different design from those of Zheng He.³¹ In consequence, his calculations grossly overstate the size of the vessel for which the rudderpost was made. The Dragon River rudderpost is certainly a significant find. Since it is the sole piece of physical evidence that bears on the question of the size of Zheng He’s “treasure ships,” we shall return to it. Meanwhile, we must consider the views of Pao Tsen-Peng.

Pao Tsen-Peng’s *On the Ships of Cheng-Ho* addresses the evident disagreement between the dimensions in the *Ming shi* (and elsewhere) for Zheng He’s ships and information in *Records of the Dragon River Shipyards*. In this latter work, published in 1553, the author, Li Zhaoxiang, then the director of the shipyards, undertook to record the specifications of the various types of vessels built there for the Ming navy. The larger vessels for which Li gives dimensions were one- and two-masted combat vessels and cruisers ranging in size from 100-*liao* combat vessels measuring 15.3 by 2.5 by 1.15 metres to 400-*liao* vessels of 27.8 by 5.1 by 1.86 metres.³² As the dimensions and *liao* ratings indicate, these were vessels of relatively light construction, designed for speed and manoeuvrability in shallow coastal waters. In an earlier period, before the Ming navy ceased operations on the high sea, much larger vessels were employed in the Maritime Transport Service and for naval patrols along

³⁰Needham, *Science and Civilisation*, IV, part 3, 480. Wakeman, “Voyages,” 10-11, note 46; and Simon Digby, “The Maritime Trade of India,” in Tapan Raychaudhuri and Irfan Habib (eds.), *The Cambridge Economic History of India. Volume 1* (Cambridge, 1982), 132-133, both follow Needham on this.

³¹Zhou, “Cong bao chuan,” 37-39, assumes that Zheng He’s vessels were flat-bottomed, shallow-draught “sand ships” (*sha chuan*) similar to the Jiangsu freighter of North China (for which, see Needham, *Science and Civilisation*, IV, part 3, 400 and 510) rather than the round-bottomed, sea-going vessels of the South. See also Zhou, “Shipbuilding,” 480-481.

³²Li Zhaoxiang, *Longjiang chuan chang zhi* [*Records of the Dragon River Shipyards*], II, 17b, 20a (104, 109 in the 1985 Taipei edition); Guan, “Zheng He xia Xiyang de chuan,” 48; Jung-pang Lo, “China as a Sea Power, 1122-1368. A Preliminary Survey of the Maritime Expansion and Naval Exploits of the Chinese People during the Southern Sung and Yuan Periods” (Unpublished PhD thesis, University of California, 1957), 554; and Pao, *Ships of Cheng-Ho*, 45. I am indebted to Mao Hongqi for translations from the works of Li Zhaoxiang, Gong Zhen, Guan Jincheng and Zhou Shide.

the sea lanes between north and south China. By Li's day, however, the use of "sea-going ships" (*hai chuan*), both as warships and as transports, had been "abrogated."³³ Li was unable to give specifications for this category of vessel, but he did provide an illustration, "for later reference," as he said, in the belief that "sea-going craft should not long remain abolished."³⁴

Li Zhaoxiang's picture of a "former sea-going ship" is of a vessel with a mainmast, after-mast and two tall foremasts. Pao Tsen-Peng and Guan Jincheng agree that this is a representation of the type of vessel built for Zheng He's voyages. From the rule that when a vessel approaches 100 feet in length it must have two masts, Guan deduced that if Zheng He's ships had only four masts they could not have been longer than about 200 feet – less than half the size stated in the *Ming shi*.³⁵ Pao argued, on the other hand, that both Li and the *Ming shi* are correct. He reasoned that Zheng He's fleet must have consisted of ships of different size and function.³⁶ Several sources, in fact, give the dimensions of two distinct classes of vessels and imply the existence of at least one other. The most extensive account is in Luo Maodeng's *San Bao Taijian xia Xiyang*, which gives the dimensions of no less than five classes: nine-masted "treasure ships" (*bao chuan*) measuring 44.4 by eighteen *zhang*; eight-masted "horse ships" (*ma chuan*), thirty-seven by fifteen *zhang*; seven-masted "supply ships" (*hang chuan*), twenty-eight by twelve *zhang*; six-masted "transport ships" (*huo chuan*), twenty-four by 9.4 *zhang*; and five-masted "combat ships" (*zhan chuan*), eighteen by 6.8 *zhang*.³⁷

Pao contends that the *San Bao Taijian xia Xiyang* corroborates and amplifies the account in the *Ming shi*, showing that Zheng He's "great fleet" (*da dong*) included at least five classes of vessels, ranging from giant nine-masted treasure ships down to the still impressively large five-masted combat ships. Pao argues further that the four-masted "sea-going vessels" constituted a separate class below Luo Maodeng's five-masted combat vessels. Below this again, Pao discerned a seventh class in the three-masted vessels depicted in the

³³Li, *Longjiang chuan chang zhi*, chapter 2, 36a-37b (141-144 in the 1985 edition); Pao, *Ships of Cheng-Ho*, 2; and Lo, "Decline of the Early Ming Navy," 157-160.

³⁴Li, *Longjiang chuan chang zhi*, chapter 2, 36a (141 in the 1985 edition), as cited in Pao, *Ships of Cheng-Ho*, 2.

³⁵See E-tu Zen Sun and Shiou-chuan Sun (eds.), *Sung Ying-hsing, 'T'ien Kung K'ai Wu: Chinese Technology in the Seventeenth Century* (University College, PE, 1966), 174; and Guan, "Zheng He xia Xiyang de chuan," 49.

³⁶Pao, *Ships of Cheng-Ho*, 13-14 and 17-19.

³⁷Luo, *San Bao Taijian*, 187-188.

stellar diagrams accompanying the map of Zheng He's sea routes in Mao Yuanyi's *Wu bei zhi* [*Records of Military Preparations*], which dates from 1621. These last two classes, Pao estimated, were approximately forty-five and forty metres in length, respectively.³⁸

There are problems with this interpretation. If Zheng He's treasure ships were in fact the enormous nine-masted vessels that the *San Bao Taijian xia Xiyang* makes them out to be, why were they not depicted with nine masts in the *Records* and in the *Wu bei zhi* charts? A more fundamental question concerns the credibility of the *San Bao Taijian xia Xiyang* as an historical source. Pao treated it as credible on some points but not on others. In the same section that specifies the size of Zheng He's vessels, Luo also gives figures for the number of vessels of each class on the first voyage. The total – 1456 vessels – includes a staggering 700 “horse ships,” each measuring 377 feet (115 metres) from stem to stern, in addition to the thirty-six even larger “treasure ships” and hundreds of other vessels, the smallest of which were still large by any standard. Pao accepted the figures for the size of the vessels but passed over those for the number of vessels in silence, offering instead a more modest (but still probably exaggerated) figure of 317 for the total number of vessels on the first voyage.³⁹ This, however, ignores the essential nature of the *San Bao Taijian xia Xiyang*, which is all of a piece in ascribing unbelievably large numbers of very large ships to Zheng He's fleet. Moreover, one part of Luo's blend of fact and fiction cannot be considered more credible than any other part solely on the ground that it is replicated elsewhere. The appearance of incredible dimensions in the *Ming shi* and in other texts, all derived from some common source, does not validate the same, or similar, dimensions in the *San Bao Taijian xia Xiyang* – or *vice versa*.⁴⁰

Luo Maodeng's classic tale of wondrous doings is unashamedly a work of historical romance. As such, it has long been regarded as the supreme exemplar of a genre of literary and dramatic works that mythicise the early

³⁸Pao, *Ships of Cheng-Ho*, 8-13.

³⁹*Ibid.*, 24-25 and 27, sums figures from three different sources: the sixty-two “large ships” (*da bo*) in the *Ming shi*, 250 “sea-going vessels” (*hai xian bo*) ordered to be built in the first year of Yongle for voyaging to the Western Ocean (another source gives the same figure for an order in the fifth year), and five others ordered to be built in the second year. See also Duyvendak, “True Dates,” 356, and 364, note 2.

⁴⁰Nevertheless, the *San Bao Taijian xia Xiyang*, which draws on earlier writings of a factual nature, including Ma, *Ying-Yai Sheng-Lan*, does contain authentic historical material. Specifically, it has better readings of Zheng He's Calicut inscription and of one line in Ma Huan's “Poem.” See Pao, *Ships of Cheng-Ho*, 42-43; and Ma, *Ying-Yai Sheng-Lan*, 74 and 138.

Ming voyages and which found an appreciative audience among Chinese of all classes in the later Ming period.⁴¹ In the epic voyages of Zheng He's stupendous fleet and in the fabulous exploits of their legendary commander – no less a colossus than his giant treasure ships – late Ming China was entertained by an enchanting vision of a glorious past.

To set against the extravagant claims of the *San Bao Taijian xia Xiyang*, there is evidence of a more reliable nature to suggest that in size Zheng He's "great ships" fell within the range of what was usual for Chinese ocean-going vessels of the period. Zheng He himself supplied evidence for this in one of three temple inscriptions which he set up to commemorate his journeys, two of which certainly (and all three probably) date from shortly before the departure of the seventh voyage. The undated inscription, from the Temple of the Calm Seas near Nanjing, which survives only in fragmentary form, refers to the size of the ships on the first and third voyages:

In the third year of Yongle government troops rode 2000 *liao* sea-going ships [*hai chuan*] and eight-oar ships [*ba lu chuan*].

In the seventh year of Yongle, government troops rode 1500 *liao* sea-going ships and eight-oar ships.⁴²

Exactly what was meant by *liao* in rating ships in the Ming period (and earlier) has been a vexing question for historians. In the 1950s Jung-pang Lo proposed that it was a measure of tonnage equal to a weight of 400-500 pounds. Lo concluded that Zheng He's 2000-*liao* ships would have had a burthen of 400-500 short tons.⁴³ While some historians have accepted Lo's conclusions, others, notably Pao Tsen-peng, have recognised that *liao* ("material") was in fact a measure of the amount of timber which went into the construction

⁴¹See the comments of the seventeenth-century scholar Ts'ien Tseng [Qian Zeng], as cited in Pelliot, "Les grands voyages," 342. See also Roderich Ptak, *Cheng Hos Abenteuer im Drama und Roman der Ming-Zeit: Hsia Hsi-yang: eine Übersetzung und Untersuchung: Hsi-yang chi, ein Deutungsversuch* (Stuttgart, 1986).

⁴²Guan, "Zheng He xia Xiyang," 48; and Pao, *Ships of Cheng-Ho*, 28.

⁴³Lo, "China as a Sea Power, 1122-1368," 555; and Lo, "Chinese Shipping and East-West Trade from the Tenth to the Fourteenth Century," in Michel Mollat (ed.), *Sociétés et compagnies de commerce en Orient et dans l'Océan Indien* (Paris, 1970), 173-174.

of a vessel, though without being able to put a value on it.⁴⁴ A way around this problem was sought in the 1970s by Hsu Yun-ts'iao, who estimated the size of a 2000-*liao* vessel by extrapolation from the known dimensions of Ming naval boats of 100-400 *liao*. Hsu's conclusion was that a 2000-*liao* vessel would have dimensions of about 166 by 24.3 by 8.1 feet.⁴⁵ He did not, however, indicate how he arrived at these figures. They are in any case of doubtful relevance since the rather extreme ratios of these naval boats are specific to their type and not the same as those of ocean-going vessels.

The inscription in the Temple of the Calm Seas shows that Zheng He's vessels were of at least two kinds: "eight-oar vessels" and vessels designated by their *liao* rating. This agrees, though is not identical, with what we find in Zhu Yunming's *Xia Xiyang [Down to the Western Ocean]*, an early sixteenth-century work which preserved from an earlier document minute details of the itinerary of the seventh voyage together with a short note on the vessels. According to this, there were ships with individual names, such as *Qing He (Pure Harmony)* and *An Ji (Peaceful Crossing)*, and others that were designated by numbers ("One," "Two," etc.). The types of vessel included "great eight-oar vessels" and "secondary eight-oar vessels."⁴⁶

Eight-oar vessels and *liao*-rated vessels are referred to in the *Meng liang lu*, a thirteenth century text:

And as to the ocean merchant ships they are of different sizes. The large ones of 5000 *liao* will carry 500 or 600 men; the second class of from 2000 to 1000 *liao* will also carry 200 or 300 men; the rest are called Tsuan-feng, large and small having eight oars [*da xiao ba lu chuan*] or six oars and each boat can carry more than 100 men.⁴⁷

⁴⁴Ma, *Ying-Yai Sheng-Lan*, 28, note 2; Wakeman, "Voyages," 10, note 46; and Jacques Dars, "Les jonques chinoises du haut mer sous les Song et les Yuan," *Archipel*, XVIII (1979), 42 and 47-48. Needham, *Science and Civilisation*, IV, part 3, 481 and 482, note h, expresses reservations.

⁴⁵Hsu Yun-ts'iao, "Notes," 139-140.

⁴⁶Ma, *Ying-Yai Sheng-Lan*, 14-18.

⁴⁷A.C. Moule, "The Wonder of the Capital," *New China Review*, III, No. 5 (October 1921), 365-366. Cf. the twelfth-century *Pingzhou ke tan (Pingzhou pillow talk)*, as cited in Needham, *Science and Civilisation in China*, IV, part 1, 279: "according to the government regulations (*chia ling*) concerning sea-going ships (*hai po*), the larger ones can carry several hundred men, and the smaller ones may have more than a hundred men on board."

Eight-oar vessels, called *zuanfeng chuan* ("windborers") because of their ability to sail close to the wind, were employed in the state grain transport service under the Yuan and early Ming.⁴⁸ Eight-oar vessels are also mentioned in government regulations of 1292 which restricted merchant vessels trading overseas to just one accompanying eight-oar vessel and one small tender.⁴⁹ Eight-oar vessels were probably needed to tow the lumbering merchantmen under certain circumstances.⁵⁰ Zheng He's eight-oar vessels may have been used for the same purpose, though they could also have served as transports. It is likely that vessels of this type were withdrawn from grain transport and refitted for service on the high seas between 1403 and 1419.⁵¹ They probably were two-masted craft with a length of about twenty-five metres.⁵²

What can one say about the vessels of 1500 and 2000 *liao* that Zheng He stated were used on the first and third voyages? Clearly they were not the largest of China's ocean-going vessels, since the *Meng liang lu* tells of vessels of 5000 *liao*. I have argued elsewhere that the *Meng liang lu*'s 5000-*liao* vessels can be identified with the great merchant vessels of Quanzhou described by Marco Polo. These could carry 5000-6000 "baskets" (i.e., 1125 to 1350 tonnes) of pepper, equivalent to about 1520-1860 tons of fifty cubic feet.⁵³ There is also evidence to suggest that these vessels were approximately twice the dimensions of the thirteenth-century "Quanzhou ship," the remains of which were uncovered in Quanzhou Bay in 1973.⁵⁴

⁴⁸Sun and Sun (eds.), *Sung Ying-hsing*, 176-177.

⁴⁹Lo, "China as a Sea Power, 1122-1368," 400.

⁵⁰Polo and Ibn Battuta mention the use of oars by both the large freighters and the small attendant vessels. See Moule and Pelliot, *Marco Polo*, I, 355-356; and Gibb and Beckingham (eds.), *Ibn Battuta*, IV, 814.

⁵¹Needham, *Science and Civilisation*, IV, part 3, 479, note f. For the use of grain transport vessels in overseas campaigns under the Yuan, see Jung-pang Lo, "The Controversy over Grain Conveyance during the Reign of Qubilai QaQan, 1260-94," *Far Eastern Quarterly*, XIII (1952), 281-283.

⁵²The sea-going, flat-bottomed rice transports used alongside eight-oar vessels were about eighty-eight by fourteen *chi* (27.4 by 4.3 metres). See Sun and Sun (eds.), *Sung Ying-hsing*, 174 and 177.

⁵³For the basis of these and following estimates, see Christopher Wake, "The Great Ocean-going Ships of Southern China in the Age of Chinese Maritime Voyaging to India, Twelfth to Fifteenth Centuries," *International Journal of Maritime History*, IX, No. 2 (December 1997), 51-81.

⁵⁴*Ibid.*, 62-68.

The Quanzhou ship was a three-masted vessel of about thirty-four metres in length and 9.8 metres in the beam, with an estimated draught of three metres, a displacement of about 374 tonnes, and a burthen of about 230 tons of fifty cubic feet.⁵⁵ A vessel of twice the dimensions of the Quanzhou ship would have had a burthen of approximately 1890 tons, which equates to the capacity of the largest of the vessels described by Polo. A separate line of reasoning suggests that the Quanzhou ship and a vessel of twice its dimensions might have *liao* ratings of around 1200 and 5000-5500 *liao*, respectively.⁵⁶

As far as the *liao* ratings are concerned, both the Quanzhou ship and Zheng He's 1500- and 2000-*liao* vessels belong in the *Meng liang lu's* second category of sea-going merchant vessels, those of 1000 to 2000 *liao*. We know that Zheng He's fleet included sea-going vessels of the Fujian (Quanzhou) type. Initially these were built in Fujian. Later, Fujian shipwrights were employed on the construction of vessels for Zheng He at the Dragon River Shipyards. The main requirement in terms of tonnage was for transports to carry men, supplies and trade goods. Two different types of Fujian vessel were probably used for this purpose. Ordinary merchant vessels of the same type (though not necessarily the same size) as the Quanzhou ship, in which the hull space was divided into cargo compartments, were appropriate to transport goods. Vessels carrying soldiers and officials were probably similar in design to the "guest ships" (*ke zhou*) employed by the Song emperors for sending foreign missions on their homeward journeys. Like the Quanzhou ship, these were round-bottomed, about ten *zhang* in length and 2.5 *zhang* in the beam (thirty-one by 7.7 metres) – slightly shorter and narrower than the Quanzhou ship – and had a height at the stern of three *zhang* (similar to the Quanzhou ship). The hold capacity of guest ships was only about ninety-three tons of fifty cubic feet, since most of the hull space was taken up with accommodation for the crew. The embassy officials and their entourage were lodged in structures on the main deck.⁵⁷

If Zheng He's vessels were in fact scaled-up versions of the Quanzhou ship and the guest ships of the Song era, we might expect the 2000-*liao* vessels

⁵⁵"Preliminary Attempts at Restoration of the Sung Dynasty Seagoing Vessel in Ch'üan-chou Bay," *Chinese Sociology and Anthropology*, IX, No. 3 (1977), 101-102. For burthen, see Wake, "Ocean-going Ships," 63.

⁵⁶Wake, "Ocean-going Ships," 62-68.

⁵⁷Xu Jing, *Xuanhe feng shi Gaoli tu jing* (Illustrated Record of an Embassy to Korea in the Xuanhe Reign Period), as translated in L.G. Paik, "From Koryu to Kyung by Soh Keung, Imperial Chinese Envoy to Korea 1124 A.D.," *Transactions of the Korea Branch, Royal Asiatic Society*, XXI (1932), 92-94. The hold size is inferred from grain-carrying capacity.

to have dimensions of about forty-one by twelve by four metres and a burthen of about 550 tons, and the 1500-*liao* vessels to have a burthen of about 360 tons.⁵⁸ These would be large vessels by the standards of the day. Zheng He's great fleet, which according to his account consisted of more than 100 ocean-going ships, would certainly have been an impressive sight even if it consisted of vessels no larger than these.⁵⁹

There is, however, evidence to suggest that Zheng He's fleet also included larger vessels of the size of the great four-masted Indiamen of Quanzhou described by Marco Polo. In the first place, there is the rudderpost discovered in 1962 at the site of the Dragon River Shipyards. The size of this rudderpost is exactly right for a vessel of twice the dimensions of the Quanzhou ship: dimensions of about sixty-eight by nineteen by 6.5 metres and a burthen of around 1890 tons, which equates to the capacity of the Quanzhou Indiamen of Marco Polo's day.⁶⁰

There is also Fei Xin's statement that the vessels of the third voyage set out "with twelve sails unfurled."⁶¹ "Twelve sails" implies vessels as big as the Quanzhou Indiamen, that is to say vessels with four large masts, each with a main sail and topsail ("wild fox sail," *yei hu fan*), two demountable masts or spars carrying spinnakers ("kerchiefs," *tou pu*), and two bowsprit sails ("pursuer sails," *tou ji*).⁶² Marco Polo does not specifically mention topsails or bowsprit sails, but he does state that the Quanzhou Indiamen had two demountable masts in addition to four fixed ones. Moreover, both Polo and the fourteenth-century traveller, Ibn Battuta, states that they carried up to twelve

⁵⁸Based on estimates of the Quanzhou ship in Wake, "Ocean-going Ships," 62-68.

⁵⁹Duyvendak, "True Dates," 344 and 349.

⁶⁰Wake, "Ocean-going Ships," 63-64. A possible reference to ships of this size occurs in Xu Jing's *Xuanhe feng shi Gaoli tu jing* (Paik, "From Koryu to Kyung," 92 and 94). According to this, the mission to Korea in 1124 included two "Sacred Ships (*shen zhou*)...as large as a mountain...They awed the monsters of the sea, and added luster to the glory and dignity of the Emperor, and they terrified the barbarians." The ambiguous statement that they had "a length, width, height and size [*sic*]...about three times that of the guest ships" is suggestive, though not to be taken literally.

⁶¹Pelliot, "Les grands voyages," 282, note 2. Roderich Ptak, the editor of the 1996 edition of Fei, *Hsing-ch'a sheng-lan*, 33, chooses to follow W.W. Rockhill, "Notes on the Relations and Trade of China with the Eastern Archipelago and the Coast of the Indian Ocean during the Fourteenth Century," *T'oung Pao*, XVI (1915), 92, in changing "twelve" to "all" in the text.

⁶²See Needham, *Science and Civilisation*, IV, part 3, 404-405 and 602.

sails.⁶³ According to another fourteenth-century traveller, Friar Jordanus, “with a fair wind they carry X sails.”⁶⁴ Pointing in the same direction is the statement of Gong Zhen, an officer on the seventh voyage, that Zheng He’s “majestic and peerless” vessels required 200 to 300 men to work them.⁶⁵ This jibes with Polo’s statement that the Quanzhou Indiamen were worked by up to 300 sailors.⁶⁶

Why did Zheng He not refer to these great vessels in his inscription of 1430-1431? One possibility is that they were not brought into use until after the third voyage, when the voyages were extended beyond India, though against this (but perhaps not conclusively) is the fact that Fei Xin’s reference to twelve sails related specifically to the third voyage. Alternatively, it may be that the inscription (which in any case is incomplete) meant simply what it said: that 1500- and 2000-*liao* vessels and eight-oar ships were employed for the transport of troops.⁶⁷

The monstrous dimensions attributed to Zheng He’s ships in the *Ming shi* and other sources – a length of 137 metres and a width of fifty-six metres – have no basis in reality, as was recognised by W.P. Groeneveldt in the 1870s and by Jung-pang Lo in the 1950s. Their endorsement in standard works like *The Cambridge History of China*, notwithstanding the reservations of generations of scholars, is unfortunate on two counts. To the question of the true size of Zheng He’s great ship, “a cardinal problem of naval archaeology,” as Needham noted, it gives an egregiously wrong answer.⁶⁸ Beyond this, it suggests also that important aspects of the history of the early Ming voyages cannot be extricated fully from the realm of the fabulous and the fanciful. Yet there is sufficient reliable evidence to show that, while the scale and scope of

⁶³Moule and Pelliot, *Marco Polo*, I, 90; and Gibb and Beckingham (eds.), *Ibn Battuta*, IV, 813.

⁶⁴Friar Jordanus, *Mirabilia Descripta. The Wonders of the East* (London, 1863), 55.

⁶⁵Ma, *Ying-Yai Sheng-Lan*, 56; and Xiang Da, *Gong Zhen: Xiyang fan guo zhi* [*Records of Foreign Countries in the Western Ocean*] (Beijing, 1961), 12.

⁶⁶Moule and Pelliot, *Marco Polo*, I, 90 and 355.

⁶⁷It may also be that Zheng He and his officers travelled on the smaller, more manoeuvrable 1500- and 2000-*liao* vessels rather than the ponderous “treasure ships,” just as it was the smaller “guest ships,” rather than the huge “sacred ships” accompanying them, that carried the Chinese envoys to Korea in 1124; see Paik, “From Koryu to Kyung,” 92-93.

⁶⁸Needham, *Science and Civilisation*, IV, part 3, 480.

the voyages were without parallel in imperial China's history, the vessels were of a size that was not out of the ordinary for Chinese ocean-going vessels of the period.

The "sea-going ships" of 1500 and 2000 *liao* referred to in Zheng He's inscription in the Temple of the Calm Seas were probably not greatly different in design from the Quanzhou ship or the guest ships employed on official missions under the Song. If their proportions were similar to those of the Quanzhou ship, then the 2000-*liao* vessels would probably have had a length of about forty metres and a burthen of about 550 tons of fifty cubic feet. An altogether different category of vessels was that of the treasure ships – the "gem [-bearing] ships" (*bao chuan*) of the "Three-Jewel Eunuch" (*San Bao Taijian*), so-called because they brought back gems and other luxury goods from the Western Ocean – which were much larger.

Zheng He's expeditions did not have the sole purpose of fostering relations with distant tributaries with a view to enhancing the emperor's prestige and supplying the court with tributary goods. They were also commercial ventures on a grand scale in which the state took over the carrying trade between China and the west coast of India. This was a trade in rare and precious luxuries, much of it destined for consumption by the official class, and also in pepper, an item of lower value-to-volume ratio that comprised the bulk of China's imports from the Indian Ocean at this time. The decision to take the maritime trade with India out of the hands of private traders was made by the Yongle emperor at the beginning of his reign. The great treasure fleets sent out under the command of Zheng He were the means of carrying out the emperor's grand design.⁶⁹ All the reliable evidence points to Zheng He's treasure ships as being similar to the Quanzhou Indiamen that had carried on the trade with India for three centuries, and which Polo tells us could carry up to 6000 *sportas* (1350 tonnes) of pepper. The largest of these great vessels had an estimated length of about sixty-eight metres and a burthen of about 1860 tons of fifty cubic feet.

When the Chinese finally gave up voyaging to India after the middle of the fifteenth century, vessels of the size of the Quanzhou Indiamen ceased to be built. It seems most likely that it is the memory of these truly great vessels – certainly the largest in the world in their day – that lies at the root of the legend of the Three-Jewel Eunuch who went down to the Western Ocean with ships of incomparable size and splendour.

⁶⁹See Ma, *Ying-Yai Sheng-Lan*, 140-141, 151-153, 155 and 178; and T'ien Ju-kang, "Cheng Ho's Voyages and the Distribution of Pepper in China," *Journal of the Royal Asiatic Society*, No. 2 (1981), 186-197.

MARITIME HERITAGE 2005
18-20 APRIL 2005
BARCELONA, SPAIN

Maritime Heritage 2005, which is co-sponsored by the Wessex Institute of Technology, the Polytechnic University of Catalunya and the Maritime Museum of Barcelona, will focus on the state of the art technology and the most up-to-date discoveries to be applied to the preservation of maritime heritage.

The conference aims to bring together scholars and professionals to discuss a variety of topics related to maritime heritage. In addition to the scientific advances, the meeting will discuss the future of historic harbours, dockyards and other similar maritime structures in today's world, as well as the function of historic vessels and their heritage value. It will also address problems, such as the role of development schemes and relationships between tourism and maritime heritage and the need to protect the latter by suitable legislation and support initiatives. Another major issue to be addressed will be the role of education in developing the right attitudes towards maritime heritage and the responsibility of the media to portray maritime heritage in a truthful and accurate manner. It is expected that papers presented at Maritime Heritage 2005, which will be published, will make an important contribution to recent advances in research and up-to-date studies of buildings, vessels and diverse artefacts related to maritime heritage. The language of the conference will be English.

Proposals, accompanied by a 300-word abstract, should be submitted as soon as possible to:

Ms. Katie Burnham, Conference Secretariat, Maritime Heritage 2005, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton, England SO40 7AA.

Fax: +44 (0) 238-029-2853

Phone: +44 (0) 238-029-3323

E-mail: kbanham@wessex.ac.uk